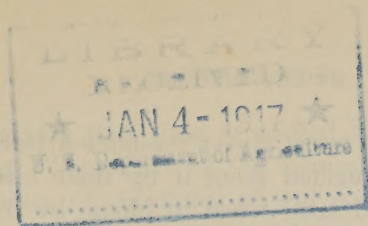


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Issued January 2, 1917.

United States Department of Agriculture,

BUREAU OF PLANT INDUSTRY,

New and Rare Seed Distribution,

WASHINGTON, D. C.

SWEET CLOVER.

Object of the distribution.—The distribution of new and rare seeds has for its object the dissemination of new and rare crops, improved strains of staple crops, and high-grade seed of crops new to sections where the data of the Department of Agriculture indicate such crops to be of considerable promise. Each package contains a sufficient quantity for a preliminary trial, and where it is at all practicable the recipient is urged to use the seed for the production of stocks for future plantings. It is believed that if this practice is followed consistently it will result in a material improvement in the crops of the country.

Please make a full report on the accompanying blank regarding the results you obtain with the seed.

DESCRIPTION.

There are three species of sweet clover grown under cultivation in the United States at the present time, namely, white sweet clover (*Melilotus alba*), biennial yellow sweet clover (*Melilotus officinalis*), and annual yellow sweet clover (*Melilotus indica*).

White sweet clover is commonly referred to as sweet clover, melilotus, or melilot. This biennial leguminous plant makes a much larger growth than either of the other species and comprises a very large percentage of the acreage seeded to sweet clover at the present time. It should preferably be grown in all sections of the United States for forage, except possibly at high altitudes in the North.

Biennial yellow sweet clover, often called yellow sweet clover, is a smaller, more decumbent plant which blooms from 10 to 14 days earlier than the white species. This plant is preferred by many people in Montana, as it produces a better quality of hay and matures earlier than white sweet clover. It is grown to a limited extent in many sections of the country. The indications are that it will do well in the extreme South.

Annual yellow sweet clover, known as sour or bitter clover, is grown primarily as a green-manure crop in orchards in the Southwest. This plant has no value in the northern or central sections of the United States.

The different species of sweet clover resemble alfalfa when young, but they may be distinguished from it by their bitter taste, their smooth, shiny leaves, and later when in bloom by their long, loose racemes of white or yellow flowers in contrast to the purple flowers of common alfalfa.

One of the most notable features of sweet clover is its root system. During the first season of growth the roots develop to a large size, striking deeply into the soil and becoming quite fleshy. They often reach a diameter of 1 inch at the crown. Sweet clover has a central taproot, which branches much more freely than the taproot of alfalfa. On account of the fleshy character of the roots, a large quantity of vegetable matter is added to the soil even when the tops of the plants are removed.

The methods here described for the utilization and cultivation of sweet clover apply to the white and to the biennial yellow species.

SOILS ADAPTED TO SWEET CLOVER.

Sweet clover has been grown successfully on all the principal soil types in the United States provided they were well drained, inoculated, and not acid. This plant prefers limestone soils, and it is upon this type of land that it grows so luxuriantly in Alabama, Mississippi, and Kentucky. Sweet clover appears to be well adapted to gumbo, hardpan, and sandy soils. It is no more tolerant of poor drainage than red clover, but it will withstand a higher water table than alfalfa in the West. This crop is more resistant to alkali than any of the grains or alfalfa. On this account many acres of land too alkaline for other crops are being planted to sweet clover in parts of the West. It is claimed that other less tolerant plants may be grown after sweet clover has occupied the land for a few years.

LIME REQUIREMENT OF SWEET CLOVER.

It is essential to plant sweet clover in soil that is not acid. Acid soil is one of the principal causes for so many failures with this crop in the eastern part of the United States. The successful growth of this plant in parts of the South and East is due to the fact that the soils in these particular sections contain an abundance of lime. After lime has been applied to acid soils sweet clover will succeed on them.

Before planting sweet clover in the East or South it is advisable to test the soil for acidity. This may be done by pressing together a handful of moist soil, breaking open the ball, and inserting between the halves a piece of blue litmus paper. The halves should then be pressed tightly together. If the paper turns red in a short time it

is a good indication that lime is needed for the successful growth of sweet clover. That part of the litmus paper which is inserted between the halves of the lump of soil should not come in contact with wet hands or with soil that has touched wet hands, as this will cause the paper to turn red. A number of tests should be made with soil from different parts of the field. If an acid condition prevails an application of 1 ton of burned or caustic lime or 2 tons of finely ground limestone per acre should be made before seeding. Good stands have been obtained on slightly acid soils provided a heavy application of manure was made before seeding.

PREPARATION OF THE SEED BED.

The primary requisite for obtaining a stand of sweet clover is to have a firm, thoroughly compacted seed bed with just enough loose soil on top to cover the seed. The lack of a firm seed bed is often the cause of a poor stand. When sweet clover is seeded in the spring on winter grain the seed bed is usually in good condition. If it is seeded with spring-sown grain, however, the seed bed should be rolled, preferably with a corrugated roller, after seeding. Better results are usually obtained when seeding is done in the spring on ground which has been plowed and thoroughly worked the previous fall.

INOCULATION.

Sweet clover will not make a successful growth unless the plants are inoculated. Acid soils and lack of inoculation are the two chief causes for so many failures with this crop. If the field where the seed is to be planted has not previously grown sweet clover, bur clover, yellow trefoil (black medic), or alfalfa, inoculation should be applied to either the soil or the seed. The field may be inoculated by broadcasting 300 to 400 pounds of soil to the acre from a place where one of the above-named plant grows abundantly. This soil should be scattered on a cloudy day or early in the morning or late in the evening and harrowed in immediately, as sunlight is very injurious to the inoculating germs. The seed may be moistened and 1 gallon of thoroughly inoculated soil sifted over each bushel. When this method is used the soil should only be collected from around the roots of thoroughly inoculated plants. Seed treated in this manner should never be subjected to sunlight and should be sown as soon as possible after treating. Inoculation may also be accomplished by using pure cultures of the inoculating organisms. These cultures may be obtained free of charge from the United States Department of Agriculture.

SEEDING.

The time for seeding sweet clover varies considerably in different sections of the United States. In the eastern part, in the latitude of Washington, D. C., a good stand may be obtained by seeding either in the early spring or about August 15. Better stands are usually obtained from early fall seedings than from spring seedings, as weeds are less troublesome in the autumn; however, plants from fall seedings flower and die the following season, so that a smaller root growth is obtained than when two full seasons' growth is made.

In the Southern States as far north as the Ohio River the practice is to seed during February and the early part of March. In the States farther north than this the time is correspondingly later, until in Minnesota and the Dakotas sweet clover is seeded in the latter part of April and first part of May.

For the most part sweet clover is seeded with spring grain, mostly early oats. Good stands may be obtained by seeding in the spring on winter grain. When this is done it is better to wait until the seed can be drilled in than to sow earlier on honeycombed ground, as better stands are likely to be obtained. The rainfall for any given region should determine the advisability of sowing with a nurse crop.

Only seed which germinates well should be sown. Scarified seed can now be purchased from most seed firms, and 12 to 15 pounds of such seed which germinates at least 80 per cent is sufficient to sow to the acre. When seed that germinates less is sown, the quantity should be increased in accordance with the germination. Unhulled seed is usually sown at the rate of 1 bushel or 30 pounds to the acre. This kind of seed, therefore, should be sown at least eight weeks earlier than seed which germinates well, as it will require at least that much time for the alternating temperatures of late winter and early spring to soften the seed coats so that germination will take place.

In semiarid regions the seed should be sown very early in the spring or as soon as there is sufficient moisture in the soil. At least a portion of the seed should be sown in rows 42 inches apart, so that the crop may be cultivated the same as corn. This insures a much better growth during droughty seasons.

USES OF SWEET CLOVER.

Sweet clover was used as a feed for animals at least two thousand years ago, but until recent years its most important use was as a soil improver. At the present time, in addition to being a valuable soil improver it is rapidly gaining in favor as a hay, pasture, and ensilage crop. Being a biennial plant it is well adapted to short rotations.

It is especially valuable in all sections of the country as a honey plant, furnishing nectar for bees for a long period.

SWEET CLOVER AS A SOIL IMPROVING CROP.

Sweet clover, unlike many legumes, will make a good growth on soils too depleted in humus for profitable crop production. In addition to its ability to grow and to produce a considerable quantity of forage on such soils, the large, deep roots will add vegetable matter to them. The extensive root systems do much toward breaking up subsoils, thereby providing better aeration and drainage. Not only do the plants add organic matter to the soil, but in common with other legumes they have the power of fixing atmospheric nitrogen by means of the nitrogen-gathering bacteria in the nodules on their roots. The yield of the crops which follow sweet clover is usually materially increased.

Sweet clover is a very good winter cover crop to prevent soils from gullyng and washing. It also takes up a large amount of available fertilizers which would otherwise leach out during the winter. On account of the large taproots of sweet clover, not only are fertilizers kept from leaching from the upper layers of the soil, but potassium and phosphorus are also taken up in the subsoil and deposited, at least in part, in the surface soil when the roots decay. In addition to this, much vegetable matter is added to the soil.

SWEET CLOVER AS A PASTURE CROP.

Sweet clover makes excellent pasture for horses, sheep, cattle, and hogs. Probably the easiest way to have stock create an appetite for this crop is to commence pasturing them on it when the plants are small. A sufficient number of animals should be kept in a sweet-clover pasture to keep it grazed closely. This will prevent the stems from becoming large and woody and will also induce an abundant growth of young shoots. A good stand will usually provide sufficient pasturage for 1 mature steer or from 20 to 30 shotes to the acre. Stock when pastured upon this plant make gains which compare very favorably with those obtained on either alfalfa or red clover. When pigs are turned on sweet clover they should receive in addition to the pasture a daily grain ration of about 1 pound of grain per hundredweight of live stock. Sweet clover is more drought resistant than alfalfa and will therefore produce considerable pasturage during midsummer droughts, as well as early in the spring and late in the fall.

There is but little danger of bloating when cattle or sheep are pastured on sweet clover, but it is safest to avoid turning the stock into

a clover pasture when it is wet with dew or rain or when the animals are unusually hungry.

SWEET CLOVER AS A HAY CROP.

If hay is desired, sweet clover should be cut when the plants have made no more than a 32-inch growth. At this time the leaves are most abundant and the stems have not yet become woody. If the crop is not cut until flower buds appear the hay will be coarse and stemmy and the plants are likely to be killed. The principal difficulty in utilizing sweet clover for hay in humid regions is the fact that the succulent growth is difficult to cure into a good quality of hay, as it is necessary to cut it at a time when the weather conditions are likely to be unfavorable. The hay should be raked into windrows just before the leaves begin to cure and immediately placed in cocks of such a size that they can be pitched on the wagon entire when cured. When the hay is cocked at this time the leaves will dry flat and turn water so well that it will seldom be necessary to open the cocks after rains. Sweet clover cures very slowly in the cock, but when cured the leaves are all intact.

When the seed is sown in the spring with a nurse crop, one or two cuttings of hay will usually be obtained after harvest in the South, and at times one cutting in the North-Central States when the weather conditions are favorable for growth. When seeded without a nurse crop one cutting is obtained that season in the North and two to three cuttings in the South. The following year a hay crop and a seed crop or two cuttings of hay are usually obtained.

The second crop of sweet clover comes from the buds and young shoots left on the stubble instead of from the crowns of the plants, as is the case with alfalfa and red clover. On this account the plants should be cut so high that one or two buds or young shoots will be left on each stub if a second crop is to be expected.

SWEET CLOVER AS AN ENSILAGE CROP.

Sweet clover promises to become an important ensilage crop in some sections of the country. The first crop the second season will produce about two-thirds as much silage per acre as corn. In addition to this, the second crop may be cut for either hay or seed. When the plants are run into the silo they should preferably be cut with a grain binder, as the bundles can be much more easily handled than loose plants. As the crop contains too much juice to be run into the silo immediately after cutting, it is well to permit the bundles to remain in the field until the plants are thoroughly wilted. Chemical analyses and feeding experiments show that sweet-clover ensilage

is equal to corn silage as feed. No trouble has been experienced in getting stock to eat it.

SWEET CLOVER IN ROTATIONS.

Since sweet clover is a biennial it readily lends itself to short rotations. Seeded in the early spring, either alone or with a nurse crop, it produces its largest growth the following season and is ready either to turn under as a green-manure crop or to be utilized for pasture, hay, or ensilage. In many respects it is similar to red clover. This feature allows it to be used in short rotations with most farm crops. On many soils where red clover or alfalfa does not thrive sweet clover has proved to be an excellent substitute.

SEED PRODUCTION.

In harvesting the seed it is important that the plants be cut when approximately three-fourths of the seed pods have turned brown to black. There will be some flowers and many immature pods at this time, but the field will have a brownish cast. If the crop is not cut until the late blooms mature, a large percentage of the seed will be lost from shattering. The seed crop may be cut with a grain binder, a grain header, or a self-rake reaper.

When the grain binder is used a tin or galvanized-iron pan the width of the elevators should be placed underneath the opening between the platform and lower elevator. A similar pan should be placed under the lower end of the table. These pans, with the assistance of extensions to the elevator platform and table and a guard placed at the lower end of the table, will save at least 90 per cent of the seed that would otherwise be lost from shattering. The extensions to the elevator platform and table may be made of tin or galvanized iron and should be so wide that the plants will not extend beyond them. The shape of these extensions should be such that the seed which shatters and falls upon them will be directed into the pans. The guard at the lower end of the table should be placed in such a position that the seed which shatters on the table will be directed by it into the pan below. The front end of the pan below the opening between the platform and elevators should be protected so that the stubble will not strike it. The bundles should be placed in shocks but not capped immediately after cutting. If the crop can not be thrashed within 10 days after cutting it should be stacked after being in the shock two or three days.

The grain header is used successfully in parts of the West. The upper 24 to 30 inches of the plants are removed by the header, run into barges, and placed directly in stacks or ricks. A pan should be

fastened to the lower end of the elevator to catch the seed which would be lost from shattering.

When the self-rake reaper is employed, the plants should be permitted to remain in the bunches as dropped by the machine until thrashed.

The seed crop should always be cut when the plants are damp from rain or dew, so as to avoid as much shattering as possible. Only wagons with tight or covered platforms should be used for hauling the plants from the field to the thrashing machine, as much seed will be lost from shattering if this is not done.

Sweet clover may be thrashed with a grain separator or a large-sized clover huller. When a grain separator is used, the riddles should be adjusted, the speed of the fan reduced about one-half, and several rows of smooth concave teeth replaced by corrugated teeth.

ERADICATION.

The failure of the farmers throughout the United States to make use of this valuable legume has largely been on account of the fear that sweet clover can not be eradicated from their farms when once started. The biennial nature of the plant makes the problem of eradication very easy. The clover does not give trouble in clean-cultivated or intertilled crops, as the cultivation readily kills young plants. Its appearance in meadows or grain fields should give no alarm, as mowing will serve to kill the sweet clover. This crop is seeded annually on thousands of acres of land in many sections of the country, and not a single case has been noted where it has become aggressive, with the possible exception of irrigated land in the West. In this region it becomes a pest at times along irrigation ditches.

Approved:

WM. A. TAYLOR,
Chief of Bureau.

DECEMBER 7, 1916.

[S. D. 35]